United International University
QUEST FOR EXCELLENCE

Ethical Concerns in Robotics

Course: SOC 2101

Society, Technology and Engineering Ethics Project

Section - K

Group - 04

1. 0112230416 – Afrin Hossain Trisha
2. 0112231044 – Abasa Mursalat
3. 0112310016 – A M Monoar Hossan Tushar
4. 0112330681 – Md. Akib Mehedi
5. 0112330871 – Khaled Mahmud Shihab

Date of submission: July 2, 2025

Table of Contents :

1 Abstract

As robotics continues to evolve and integrate into everyday life, it brings not only innovation but also significant ethical questions. From autonomous vehicles making life-and-death decisions to surveillance robots collecting personal data, the responsibilities and risks involved are becoming increasingly complex. This paper explores the ethical concerns in robotics, focusing on areas such as privacy, accountability, human-robot interaction, job displacement, and bias in AI algorithms. The aim is to highlight the importance of ethical thinking in the design, development, and deployment of robotic systems, ensuring technology serves humanity in a fair and responsible way.

2 Keywords

Ethical concerns in robotics , Robot ethics , Ethics in artificial intelligence , Responsible robotics , AI and ethics , Machine ethics , Killer robots , Robotics and surveillance , Emotional manipulation by robots , Deceptive robotics , AI fairness and robotics , Autonomy and accountability

3 Introduction

Robots are no longer confined to science fiction or factory floors — they are now part of our homes, hospitals, cities, and even classrooms. From voice assistants that respond to our commands to autonomous drones that deliver packages or conduct surveillance, robotic systems are changing the way we live and work. But with this rapid advancement comes a set of deep ethical questions: Can robots make moral decisions? Who is responsible when a robot causes harm? How do we protect our privacy when machines are always watching and learning?

These questions are not just theoretical. They impact how we trust and interact with machines, and how technology shapes our society. Ethical concerns in robotics are becoming urgent as we entrust machines with tasks that were once the sole domain of humans — caregiving, policing, decision-making, and more. As developers and users of these systems, we must ask ourselves: Just because we can build something, should we?

This paper begins by examining the core ethical issues surrounding robotics today and discusses why ethical frameworks must be built into robotic design from the start. In doing so, it aims to spark thoughtful discussion and encourage responsible innovation in a field that is growing faster than ever.

4 Literature Review :

The field of robotics ethics, often referred to as *machine ethics* or *roboethics*, has garnered significant scholarly attention as intelligent machines increasingly interact with humans and

operate autonomously. Several key areas have emerged in the literature, including autonomy and accountability, privacy and surveillance, emotional manipulation, and algorithmic bias. Scholars such as Sharkey (2014) and Lin et al. (2012) have warned against the deployment of lethal autonomous weapon systems (LAWS), noting the moral and legal vacuum in which these machines operate. These systems challenge Asimov's foundational ethical principles, particularly the imperative to prevent harm to humans. Barrett (2019) further argues that delegating lethal decision-making to machines undermines human dignity, as such decisions require empathy and moral reasoning—capacities robots inherently lack. This sentiment is echoed by international bodies like the Holy See, which emphasize the irreplaceable role of human judgment in warfare.

Calo (2012) introduced the idea of "robotic privacy harms," arguing that unlike traditional surveillance systems, robots are mobile and interactive, increasing their potential to intrude into private life. Studies by Malle et al. (2019) and Binns et al. (2018) highlight how robots like Roomba, Astro, and social bots not only collect massive amounts of user data but often do so without informed consent or clear accountability. These concerns are especially urgent given the lack of specific legal frameworks to govern robotic data collection in real-time settings (Lin et al., 2012).

Breazeal (2003) and Picard (1997) pioneered the study of affective computing, revealing how robots can simulate emotional responses to enhance engagement. While such features improve usability in domains like elder care or education, Fogg (2003) and Calo (2012) caution that these mechanisms can be subtly manipulative, particularly when users are unaware of the underlying algorithms or falsely attribute real emotions to machines. Companion robots like Paro, although therapeutic, raise ethical concerns about replacing human empathy with artificial affection (Wada et al., 2008).

The problem of algorithmic bias is well-documented in AI literature. Buolamwini and Gebru (2018) demonstrate how commercial facial recognition systems exhibit racial and gender disparities, while Obermeyer et al. (2019) show how healthcare algorithms can reinforce racial inequities. Dastin (2018) exposed Amazon's AI hiring tool that discriminated against women, exemplifying how biased training data can perpetuate discrimination. Scholars like Doshi-Velez & Kim (2017) and Raji & Buolamwini (2019) argue for transparency, auditing, and the development of interpretable machine learning models as essential tools for ensuring ethical outcomes.

While existing literature provides robust theoretical foundations and case studies across robotics and AI ethics, there remains a gap in integrated frameworks that guide ethical design from the earliest stages of development. Furthermore, interdisciplinary efforts—combining law, philosophy, engineering, and public policy—are essential to address the evolving ethical challenges posed by robotics in real-world applications.

5 Use Case :

5. 1 Case Study 1 : Ethical use of autonomous weapons

Asinov's famous three laws of Robotics states that Robot shouldn't harm humans. But In reality we see somethings else.

Israel Gaza Conflict

Al Jazeera's investigation finds that the Israeli military has been modifying commercial DJI drones, they show the world it is for civilian purposes but they conduct attacks and surveillance in Gaza through this drones. These drones, such as the DJI Agras, Mavic, and Avata, have been used to target hospitals, shelters, and residential areas, as well as to monitor and track Palestinians, including using drones as human shields. Despite DJI's restrictions on sales to conflict zones like Ukraine and Russia, the company continues to sell drones to Israel without implementing measures to prevent their military use in Gaza, asserting their products are for civilian use only and condemning harm caused by their equipment.

The Gospel : Israel use an AI system called Gospel to determine which target to bomb. Target recommendation can be anything from individual fighter to private homes. Aviv Kohavi (Former Head of IDF) says that it can produce 100 bombing targets a day where human analyst can produce 50 a year.

Real World Case : During a military operation in a densely populated urban area, the autonomous drones identify a group of individuals suspected of planning an attack. The drones classify the that are group based on behavioral patterns and intelligence data. However, due to the complexity of the environment and limitations in AI perception, the drones mistakenly identify a civilian family as combatants. The drones proceed to engage, resulting in civilian casualties.

Ethical Analysis in the context of Asinov's law

The use of Gospel clashes with Asinovs first law which say Robot can't harm humans

Military decision often involve moral and strategic complexities that are challenging to codify ai algorithm distinguishing between combanants and civilian, assessing colleteral damage and making real damage and making real time judgement in fluid situation challenges Asinov's law

There is issue in accountability and transparency when drones ,Ai are applied in battlefield

Key measures can be implemented

Human in the loop systems where human will do decision making

Human on the loop system allowing humans to monitor and intervene ai operation as needed

Training ai developers and military personnel ethical humantarian consideration to reinforce the importance of human judgement

Making sure transparency and accountability to ensure decision are traceable

How can be International law be adopted?

Through specific legal framework and international co operation

International treaties, set binding restrictions or bans

Ref: Asimov's Reflections: Ethical Paradigms in Israel's AI Warfare in Gaza

DOI: 10.13140/RG.2.2.35812.55683

Can autonomous weapons truly make morally responsible decisions without human oversight?

Autonomous weapons cannot truly make morally responsible decisions without human oversight. They operate based on algorithms and sensor data, lacking genuine intentions or moral understanding. As the Holy See emphasizes, autonomous systems do not possess intentions and therefore cannot bear responsibility; accountability remains with humans who design, deploy, or control these systems [4]. Without human oversight, the moral responsibility for lethal actions taken by autonomous weapons becomes ambiguous, raising significant ethical concerns about accountability and human dignity

Is Killing a Person with a Killer Robot Against Human Dignity?

Killing a person with a killer robot is considered to be against human dignity. The reason is decision to kill to an automated system—one that lacks human emotions, moral understanding, and capacity for sacrifice—deprives the act of its moral and respectful significance. Since human dignity involves recognizing the gravity and moral weight of taking a life, and this understanding is tied to human emotions such as empathy, remorse, and moral reflection, automating the killing process undermines these moral considerations. As Barrett and others argue, the capacity for emotion is central to appreciating the significance of such acts, and without it, the act becomes a disrespectful and morally debased form of killing. Therefore, from this perspective, using killer robots for lethal actions is seen as a violation of human dignity because it eliminates the moral consciousness integral to respectful killing.

Ref: Killer Robots and Human Dignity

https://doi.org/10.1145/3306618.3314291

5. 2 Case Study 2 : Privacy & Surveillance: Data Collection by Robots

Privacy & Surveillance: Data Collection by Robots

As robotic technologies become increasingly integrated into modern life from domestic settings to public infrastructures their ability to collect, analyze, and transmit data has raised significant ethical, legal, and societal concerns. The intersection of robotics, privacy, and surveillance presents complex challenges that demand critical attention from researchers, engineers, and policymakers alike.

How Robots Collect Data

Modern robots are embedded with a variety of sensing and recording technologies. These include -

Cameras: Used for visual navigation, facial recognition, and object detection.

Microphones: Used for voice command recognition and environmental audio monitoring.

Infrared and Proximity Sensors: Used for motion detection, obstacle avoidance, and spatial awareness.

GPS and Localization Systems: Used to track movement or optimize routes.

Cloud Connectivity: Allows robots to send and store collected data on remote servers, often controlled by manufacturers.

For instance, home service robots like “Roomba” not only vacuum but also create a digital map of your home. Social robots like “Pepper” interact with humans and collect behavioral and emotional data, while delivery drones record location, environmental, and image data during navigation (Cerrato et al., 2020; Sharkey, 2014).

Privacy Concerns

1. Lack of Informed Consent : Many users are unaware of the extent or purpose of the data being collected by robots. Even when informed, the terms and conditions are often buried in long, hard-to-understand documents (Malle et al., 2019).

2. Ambient Surveillance : Robots are often “always on” — continuously monitoring surroundings without active engagement. This passive surveillance becomes problematic in shared or public spaces, where bystanders have not consented (Calo, 2012).

3. Data Misuse and Security : Sensitive data collected by robots can be vulnerable to hacking, unauthorized access, or misuse by corporations for targeted advertising, behavior profiling, or even political manipulation (Lin et al., 2012). Leaked robot data could include video of private conversations, home layouts, or health information.

4. Legal Ambiguity : Most countries do not have specific legal frameworks that address data collection by robots. Existing privacy laws (e.g., GDPR in the EU) may partially apply, but often lack the granularity needed to regulate robots in dynamic, real-time environments (Binns et al., 2018).

Real-World Cases

Amazon Astro : This home robot, equipped with cameras and microphones, navigates rooms, follows people, and responds to voice commands. Privacy experts raised alarms over potential misuse of in-home surveillance data, especially by law enforcement or advertisers (EFF, 2021).

Roomba Data Leak (2022) : Internal test models captured and uploaded private home images to the cloud. Some of these images were leaked online and included identifiable human faces, raising serious concerns over test device policies and data storage security (MIT Technology Review, 2022).

Robotic Police Dogs : Used in cities like New York and Los Angeles, these robots patrol public areas with cameras and microphones. Civil rights advocates argue this leads to over-policing and racial surveillance, especially in marginalized communities (ACLU, 2020).

Ethical and Legal Implications

Roboticists and AI designers must consider privacy-by-design, meaning systems should be engineered with privacy and user control as default settings. Ethical questions also arise around consent, transparency, accountability, and fairness.

> Should robots ask for consent from all individuals within sensing range?
>
> Who is accountable for misuse of robot-collected data — the owner, manufacturer, or software provider?
>
> How can we ensure bias-free and equitable data processing in human-robot interaction?

Legal scholars suggest updating privacy laws and establishing robot-specific regulatory frameworks, while ethicists argue for multi-stakeholder involvement in decision-making (Lin et al., 2012).

Solutions and Best Practices

Data Minimization : Robots should collect only the data necessary for the task and delete it after use (Calo, 2012).

User Control and Transparency : Interfaces should clearly inform users of data practices and allow them to review, opt out, or delete stored data (Malle et al., 2019).

Secure Data Transmission and Storage : Encrypt data, especially when using cloud services, and apply regular security audits (Sharkey, 2014).

Legal Policy Development : Governments should enact laws tailored to robotic data ethics, balancing innovation with privacy protection.

5.3 Case Study 3 : Human-Robot Interaction: Emotional Manipulation

The Role of Emotions in Human-Robot Interaction :

Emotionally expressive behaviors are increasingly being used by robots built for human contact, such as social and service robots, to enhance user experience. These actions, which include gestures, tone of voice, facial expressions, and sympathetic conversation, are all intended to establish connection and trust with consumers (Breazeal, 2003) [R2]. Although these capabilities increase engagement, they also have the opportunity to affect human emotions in ways that aren't necessarily obvious.

Emotional Manipulation: Definition and Mechanisms

In HRI, emotional manipulation happens when a robot manipulates a user's emotions to accomplish a certain goal, such as enhancing user compliance, extending engagement, or changing decision-making.

This can be achieved using:

· Affective computing: Systems that recognize and simulate emotions based on user input (Picard, 1997). [R3]

· Persuasive technologies: Interfaces designed to change user behavior or attitudes through emotional cues (Fogg, 2003).[R4]

· Anthropomorphism: Giving robots human-like characteristics to foster emotional connection and empathy.

Although these mechanisms serve functional purposes, such as improving elder care or therapeutic outcomes, they also raise concerns about manipulation and deception.

Case Studies and Examples

A well-known example is the use of companion robots for elderly individuals, such as Paro—a robotic seal designed for dementia patients. These robots provide soothing interactions and responsive feedback to help ease feelings of isolation and stress (Wada et al., 2008) [R5]. Nevertheless, they may create a false sense of emotional connection, replacing genuine human contact with artificial sympathy.
In the business world, some virtual assistants and customer service catboats use emotionally

responsive conversations to boost customer satisfaction and build brand loyalty. Although this approach can be effective, it may also subtly influence consumer emotions to encourage purchases, often without the user being fully conscious of it.

Ethical Implications

The ethical concerns regarding emotional manipulation in human-robot interaction (HRI) mainly involve issues of consent, autonomy, and openness. Many users are unaware of how robots perceive and react to their emotions, which complicates the ability to provide informed consent (Calo, 2012) [R6]. Such manipulation can interfere with personal autonomy by subtly influencing users' actions—especially those who are more vulnerable, like the elderly or children. Additionally, the line between offering emotional support and taking advantage of users can be blurry. For example, when robots display artificial affection to boost user engagement, it can become ethically questionable if users are led to believe those emotions are real.

Recommendations and Future Considerations

To address these challenges, the following recommendations are proposed:

· Transparency: Robots should disclose when emotional data is being collected or used for interaction purposes.

· Ethical design: Developers must embed ethical frameworks into robot behavior to prevent manipulative strategies.

· User education: Users should be made aware of the emotional capabilities and limitations of social robots.

· Regulation: Clear guidelines and regulations are needed to define acceptable uses of emotional influence in robotics.

5.4 Case Study 4 : Bias & Discrimination : AI algorithms reinforcing societal biases

***Problem Statement*:**

AI systems learn from past data, but that data might have hidden unfairness. When the AI uses this data, it can treat some groups unfairly, especially those who are already disadvantaged.

AI hiring tools trained on old job applications may favor men over women, especially in male-dominated fields like tech [4].

In healthcare, an algorithm used in hospitals was found to favor white patients over Black patients, even when Black patients were sicker [3].

The main issue is that many companies and governments use these AI systems without checking if they're fair first. As robots and AI make more decisions in our lives, these biases could affect jobs, healthcare, and safety for millions of people.

Bias & Discrimination:

AI systems learn from data. If the data has bias, the AI will act in biased ways too. For example, facial recognition systems often make more mistakes with women and people with darker skin [1].

Hiring and Recruitment: AI tools used for screening resumes have been found to favor male candidates over female ones due to biased historical hiring data [4].

Facial Recognition: Studies have shown that some facial recognition systems have significantly higher error rates for darker-skinned individuals, especially women, compared to lighter-skinned individuals [1].

Racial Bias in Healthcare: An algorithm used in U.S. hospitals prioritized white patients over sicker Black patients [3].

Gender Bias in Voice Assistants: AI voice assistants reinforce gender stereotypes by defaulting to female voices [6].

Social and Ethical Implication

Unchecked bias in AI can result in discrimination that is difficult to detect and challenge, especially when AI decisions are opaque. This leads to ethical concerns regarding fairness, accountability, and transparency. It also poses legal challenges, particularly in contexts where discrimination is prohibited by law [7].

Real World Cases

Amazon’s AI Hiring Tool

Amazon created an AI system to help hire people. But the system gave lower scores to women’s resumes because it learned from past data where men were hired more. Amazon stopped using this tool in 2018 [4].

Facial Recognition Bias

A study found that facial recognition systems made many more mistakes when trying to identify Black women compared to white men [1].

Solution:

Use diverse training data and check AI decisions for fairness [2].

Check regularly for biased behavior.

Use tools for fairness-aware machine learning that reduce discrimination [3].

Regular testing and auditing of algorithms for discriminatory outcomes can help catch issues early [8].

Creating AI models that are interpretable allows users and regulators to understand how decisions are made [9].

5. 5 Case Study 5 : Job Displacement: Economic Impacts of Automation

How Automation Affects Employment

Automation, powered by robotics and AI technologies, has increasingly permeated industries worldwide, significantly altering the labor market. The introduction of autonomous systems into manufacturing, retail, services, and other sectors has led to both positive and negative economic outcomes. On the one hand, automation can drive productivity, reduce operational costs, and increase efficiency. On the other hand, it raises critical questions about job displacement, the future of work, and the widening economic inequality. The following outlines how automation contributes to job displacement across different sectors.

Economic Concerns: Job Displacement and Technological Unemployment

Loss of Manual Labor Jobs: Automation replaces manual labor in manufacturing and construction industries. Robots and automated systems can work continuously without rest, improving output while reducing the need for human workers. This displacement primarily impacts low-skilled, routine-based jobs, such as assembly line workers, warehouse operatives, and drivers. As tasks become automated, millions of low-income workers face the threat of job loss, particularly in developing economies that rely heavily on such jobs (Brynjolfsson & McAfee, 2014).

Impact on Service Jobs: With advancements in AI and robotics, service industries are also feeling the effects of automation. Technologies such as self-checkout kiosks, automated customer service chatbots, and autonomous delivery systems are gradually replacing traditional human roles. This trend extends to sectors like retail, hospitality, and transportation, where jobs

like cashiers, waiters, and drivers are increasingly replaced by robots or algorithms (Chui et al., 2016).

Displacement of Knowledge Workers: While automation has traditionally been seen as impacting blue-collar jobs, recent advancements suggest that even white-collar professions are not immune. AI technologies now handle tasks that once required human judgment and decision-making, such as data analysis, legal research, and medical diagnostics. While this might reduce costs for businesses, it may lead to the displacement of professionals, such as data analysts, paralegals, and medical technicians (Frey & Osborne, 2017).

Real-World Cases: Examples of Job Displacement Due to Automation

Manufacturing Industry: A prime example of automation leading to job displacement can be found in the automotive industry. Companies like General Motors and Tesla employ robots to assemble vehicles at a faster rate than human workers ever could. While automation has improved vehicle production efficiency, it has also led to job losses, particularly in areas such as welding, assembly, and inspection (Autor et al., 2019).

Retail Industry: The retail industry has also been impacted by automation, with companies like Amazon using robotic systems in their fulfillment centers. These robots handle tasks such as sorting and packing products, significantly reducing the need for human labor. Furthermore, Amazon's use of AI-powered recommendation engines to personalize customer experiences has eliminated jobs in retail management and customer service (Gretz, 2020).

Transportation Sector: The rise of autonomous vehicles, particularly self-driving trucks, poses a direct threat to jobs in the transportation sector. An estimated 3.5 million Americans currently work as truck drivers, and with the development of autonomous truck technology, this job market is expected to face significant disruptions in the coming decades (Bary, 2021).

Ethical and Legal Implications

Ethical Issues in Job Displacement: The economic impact of automation leads to ethical considerations regarding the rights of workers. Automation raises questions about the fairness of displacing workers who have built their livelihoods based on the jobs that are being replaced by machines. Should governments or businesses provide compensation, retraining programs, or social safety nets for displaced workers? This issue is particularly relevant when workers who lose their jobs may not possess the skills needed for newly created roles (Chui et al., 2016).

Legal Considerations: Legal frameworks need to evolve to address the economic impact of automation on the labor market. While automation leads to improved productivity, it also highlights the need for labor laws that protect workers who are displaced by technology. Countries like the U.S. and Japan have started exploring universal basic income (UBI) schemes, which could act as a safety net for those affected by job displacement (Brynjolfsson & McAfee, 2014). However, legal scholars argue that this is a temporary solution and that systemic changes to the economy are needed to accommodate the shift toward a more automated workforce.

Solutions and Best Practices

Retraining and Reskilling Programs : To minimize job displacement, businesses and governments should invest in retraining programs for workers. These programs should focus on equipping workers with the skills needed to transition into higher-skilled roles, such as positions in technology, healthcare, and renewable energy sectors. This proactive approach can help workers remain competitive in an increasingly automated world (Frey & Osborne, 2017).

Universal Basic Income (UBI) : One potential solution to mitigate the effects of job displacement is the implementation of a Universal Basic Income (UBI). This concept, which has gained traction among economists, advocates for a guaranteed income for all citizens, regardless of employment status. UBI could provide financial security to workers who lose their jobs to automation and ensure that they are able to continue contributing to the economy in other ways (Brynjolfsson & McAfee, 2014).

Promoting Job Creation in New Sectors : Automation can also create new job opportunities. For instance, the rise of AI and robotics in manufacturing has led to a demand for specialized roles in programming, maintenance, and robot design. Governments and businesses should invest in sectors that are likely to experience growth as a result of automation, such as cybersecurity, AI ethics, and renewable energy industries (Chui et al., 2016).

7 Conclusion

As robots and AI become more involved in our daily lives—from helping in our homes to making decisions in war zones—it’s important to pause and ask ourselves: are we building this technology in a way that respects human values?

In this paper, we explored several real-world examples that raise serious ethical questions. Autonomous weapons, for instance, make us wonder who should be responsible when machines take lives. Surveillance robots challenge our right to privacy in ways we might not even notice. Emotionally intelligent robots, while comforting, could manipulate our feelings, especially when we’re vulnerable. And biased AI systems show us how machines can unfairly

treat people based on race, gender, or other traits—often without anyone noticing until real harm is done.

What all of this tells us is simple but powerful: just because we *can* build something doesn't mean we *should*—at least not without thinking deeply about the impact. Ethics isn't just a rulebook for scientists and engineers. It's a mindset, a responsibility we all share in shaping how technology fits into society.

Moving forward, we need to design robots with fairness, empathy, and transparency in mind. We need better laws, more accountability, and most importantly, human judgment at the center of these decisions. Because in the end, technology should help us become better—not replace what makes us human.

References

I. Binns, R., Veale, M., Van Kleek, M., & Shadbolt, N. (2018). 'It's reducing a human being to a percentage': Perceptions of justice in algorithmic decisions. *CHI Conference on Human Factors in Computing Systems*.

https://doi.org/10.48550/arXiv.1801.10408

II. Calo, R. (2012). Robotics and the Lessons of Cyberlaw. *California Law Review*, 103(3), 513–563.

https://digitalcommons.law.uw.edu/faculty-articles/23

III. Cerrato, A., Sanguinetti, A., & Iocchi, L. (2020). Designing socially acceptable robots for assisted living. *ACM/IEEE International Conference on Human-Robot Interaction Companion*.

https://doi.org/10.1177/20556683221101389

IV. EFF (2021). Amazon's Astro is a robot with serious privacy concerns. *Electronic Frontier Foundation*.

V. Lin, P., Abney, K., & Bekey, G. (2012). *Robot Ethics: The Ethical and Social Implications of Robotics*. MIT Press.

VI. Malle, B. F., Scheutz, M., & Arnold, T. (2019). Sacrificial dilemmas in robot ethics: Why robots should not be programmed to kill. *Paladyn, Journal of Behavioral Robotics*, 10(1), 44–52.

VII. MIT Technology Review (2022). How Roomba test images ended up on Facebook.

VIII. Sharkey, N. (2014). Warnings from the trenches: Legal and ethical issues in robotics. *Law, Innovation and Technology*, 6(2), 251–266.

IX. ACLU (2020). The Rise of Robot Policing.

R1:https://www.researchgate.net/publication/366807836_SoftSAR_The_New_Softer_Side_of_Socially_Assistive_Robots-Soft_Robotics_with_Social_Human-Robot_Interaction_Skills

R2:-https://dl.acm.org/doi/10.1145/3570169
Breazeal, C. (2003). *Emotion and sociable humanoid robots*. International Journal of Human-Computer Studies, 59(1–2), 119–155. https://doi.org/10.1016/S1071-5819(03)00018-1

R3:- https://core.ac.uk/download/478132495.pdf

R4:https://www.researchgate.net/publication/230877240_Persuasive_Technology_Using_Computers_to_Change_What_We_Think_and_Do
Fogg, B. J. (2003). *Persuasive technology: Using computers to change what we think and do*. Morgan Kaufmann.

Picard, R. W. (1997). *Affective computing*. MIT Press.

R5:-Wada, K., Shibata, T., Saito, T., & Tanie, K. (2008). *Robot assisted activity for elderly people and nurses at a day service center*. Proceedings of the IEEE, 92(11), 1780–1788. https://doi.org/10.1109/JPROC.2004.835378

R6:- Calo, R. (2012). *Robotics and the lessons of cyberlaw*. California Law Review, 103(3), 513–563. https://doi.org/10.2139/ssrn.2044797

Reference:

[1] Buolamwini, J., & Gebru, T. (2018). *Gender shades: Intersectional accuracy disparities in commercial gender classification*. In Proceedings of the 1st Conference on Fairness, Accountability and Transparency

[2] MIT Technology Review, 2021.

[3] Obermeyer, Z., Powers, B., Vogeli, C., & Mullainathan, S. (2019).

[4] Dastin, J. (2018). Amazon scraps secret AI recruiting tool.

[5] Mehrabi, N., Morstatter, F., Saxena, N., Lerman, K., & Galstyan, A. (2021). *A survey on bias and fairness in machine learning*. ACM Computing Surveys (CSUR), 54(6), 1-35.

[6] West, M., Kraut, R., & Chew, H. E. (2019). *"I'd Blush if I Could": Closing Gender Divides in Digital Skills Through Education*. UNESCO.

[7] Binns, R. (2018). *Fairness in machine learning: Lessons from political philosophy*. In Proceedings of the 2018 Conference on Fairness, Accountability, and Transparency.

[8] Raji, I. D., & Buolamwini, J. (2019). *Actionable auditing: Investigating the impact of publicly naming biased performance results of commercial AI products*. In Proceedings of the 2019 AAAI/ACM Conference on AI Ethics and Society.

[9] Doshi-Velez, F., & Kim, B. (2017). *Towards a rigorous science of interpretable machine learning*. arXiv preprint arXiv:1702.08608.

1. **Autor, D. H., Dorn, D., & Hanson, G. H.** (2019). *The China Shock: Learning from Labor Market Adjustment to Large Changes in Trade.* Annual Review of Economics, 11, 223-250.

2. **Bary, E.** (2021). *The Threat of Self-Driving Trucks to America's Trucking Jobs.* Wall Street Journal. https://www.wsj.com

3. **Brynjolfsson, E., & McAfee, A.** (2014). *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies.* W.W. Norton & Company.

4. **Chui, M., Manyika, J., & Miremadi, M.** (2016). *Where machines could replace humans—and where they can't (yet).* McKinsey & Company. https://www.mckinsey.com

5. **Frey, C. B., & Osborne, M. A.** (2017). *The future of employment: How susceptible are jobs to computerization?* Technological Forecasting and Social Change, 114, 254-280.

6. **Gretz, A.** (2020). *Amazon's Use of AI in the Warehouse: An Ethical and Legal Examination.* Ethics in Technology Journal.